

NASA SensorWeb: From v2.0 to v3.0

Workflows and WCPS for Space Applications

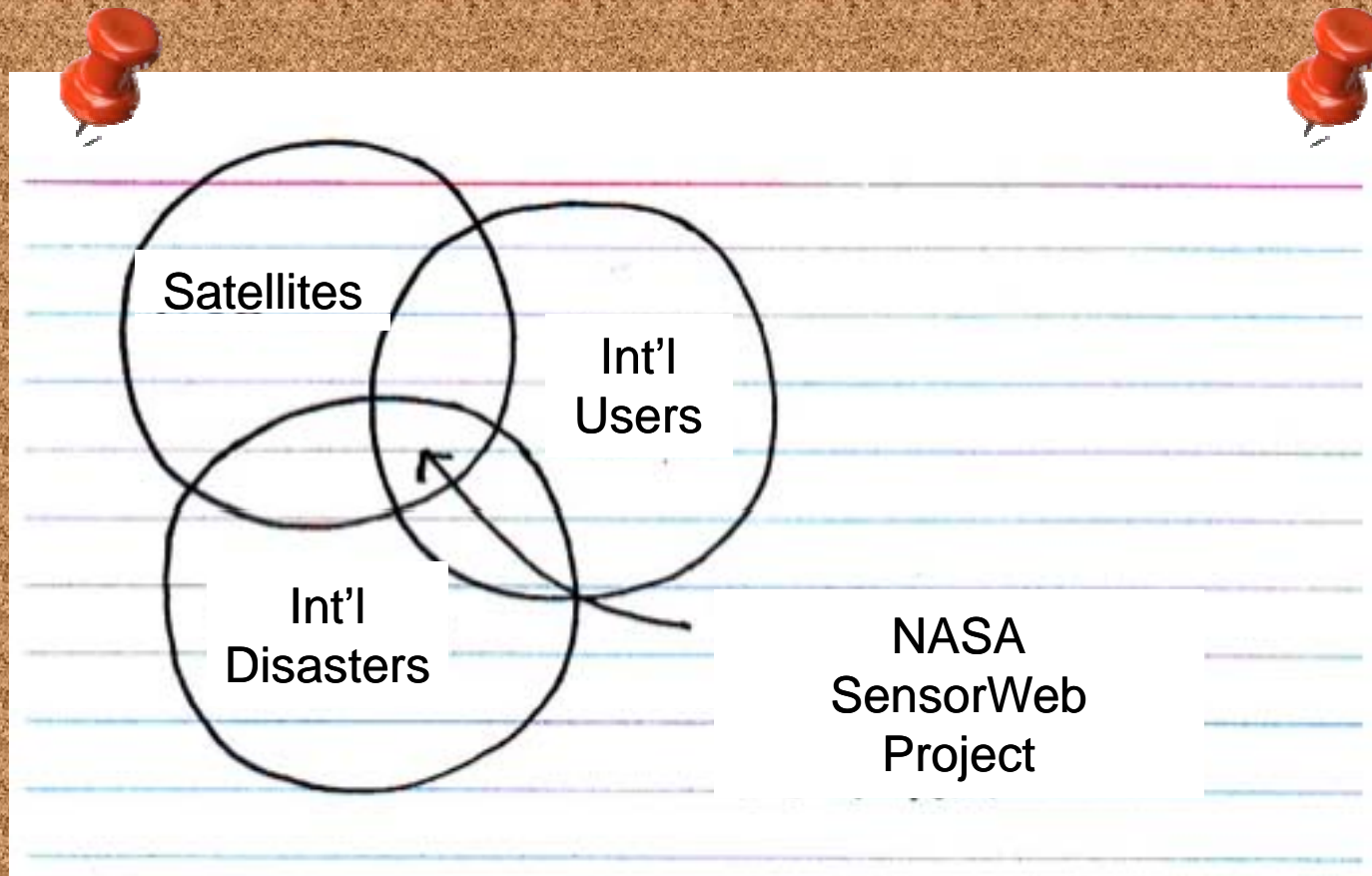
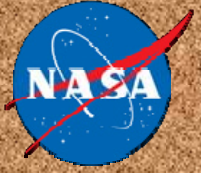
Open Geospatial Consortium TC Meeting
Workflow & Coverages Working Groups
June 2010, Silver Spring MD

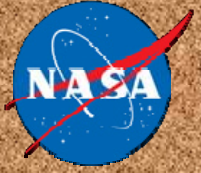
Pat Cappelaere (Vightel)
Dan Mandl (GSFC)
Stu Frye (SGT)



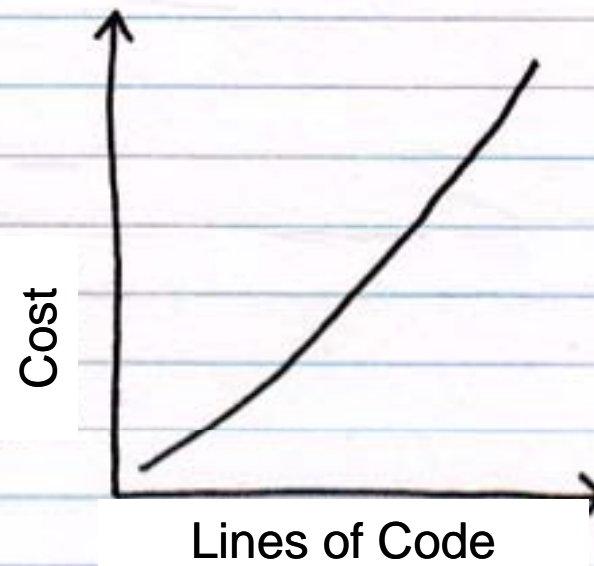
Agenda

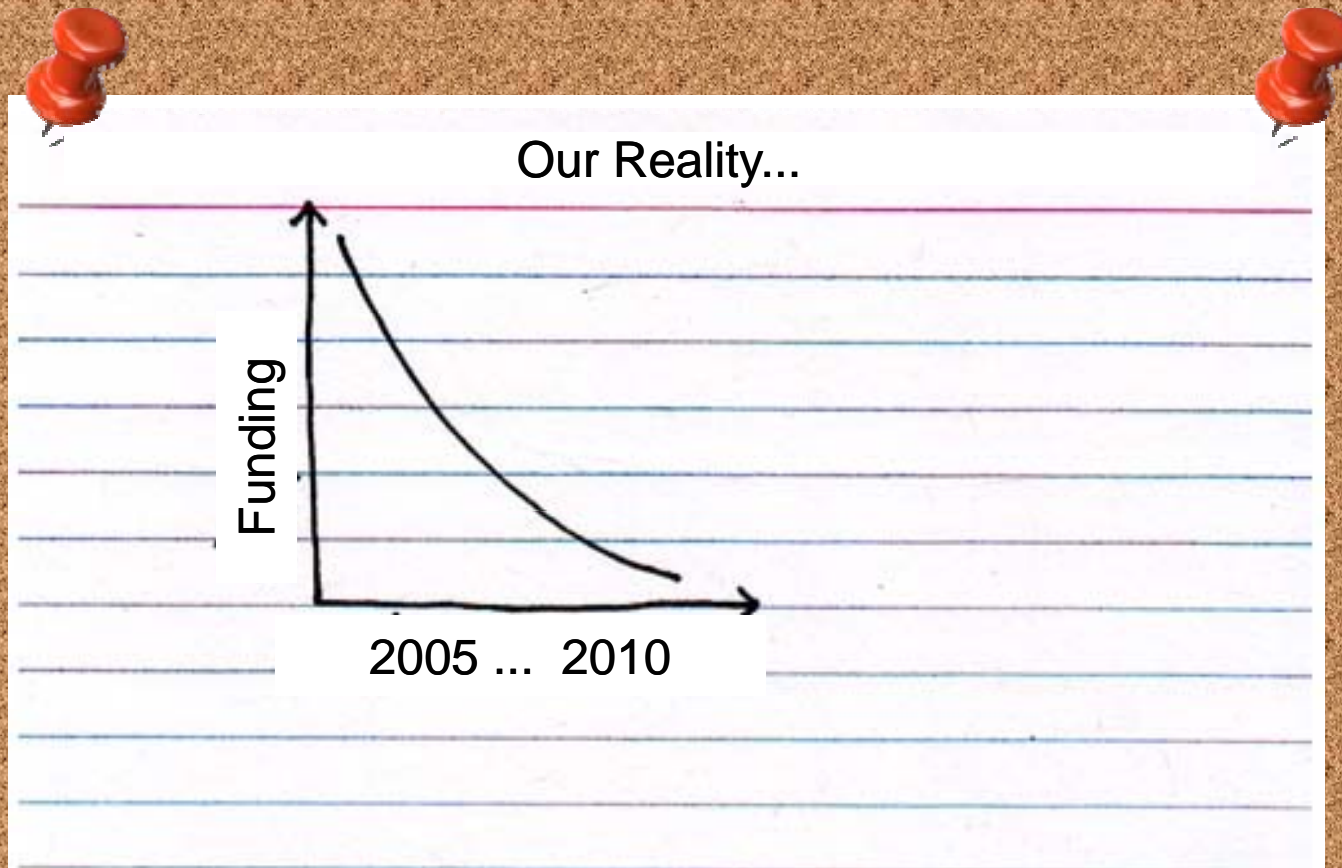
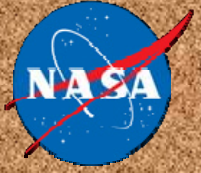
- Our Standard Compliance Evolution
- v2.0 Accomplishments & Lessons Learned
- v3.0 Architecture Migration
 - Towards A Unified Interface
 - Examples

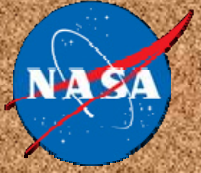




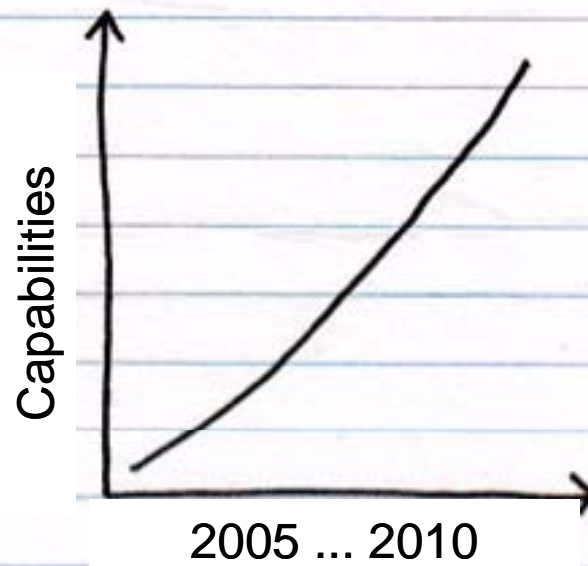
Big Software Project: Cost is $f(\text{code})$

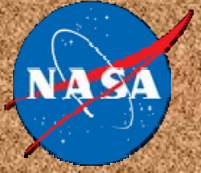




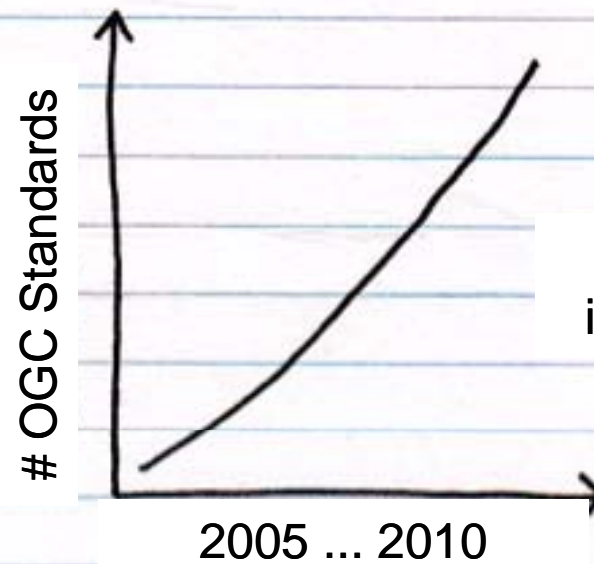


But we have made some good progress...

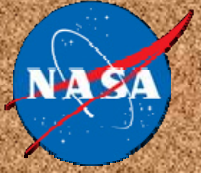




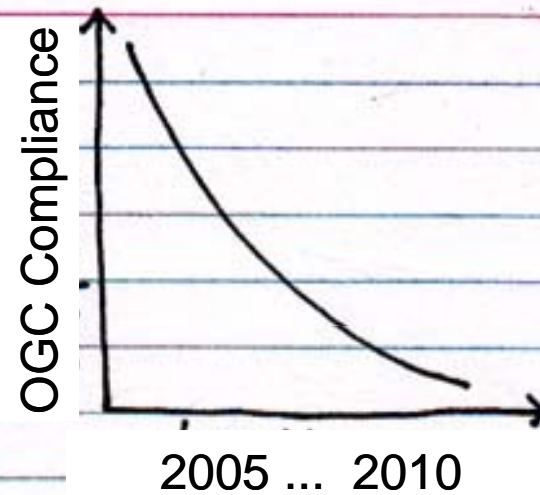
Number of OGC Standards Has Increased Significantly



which would
increase our cost!



So Our OGC Compliance Has Significantly Decreased





v2.0 Architecture

SPS

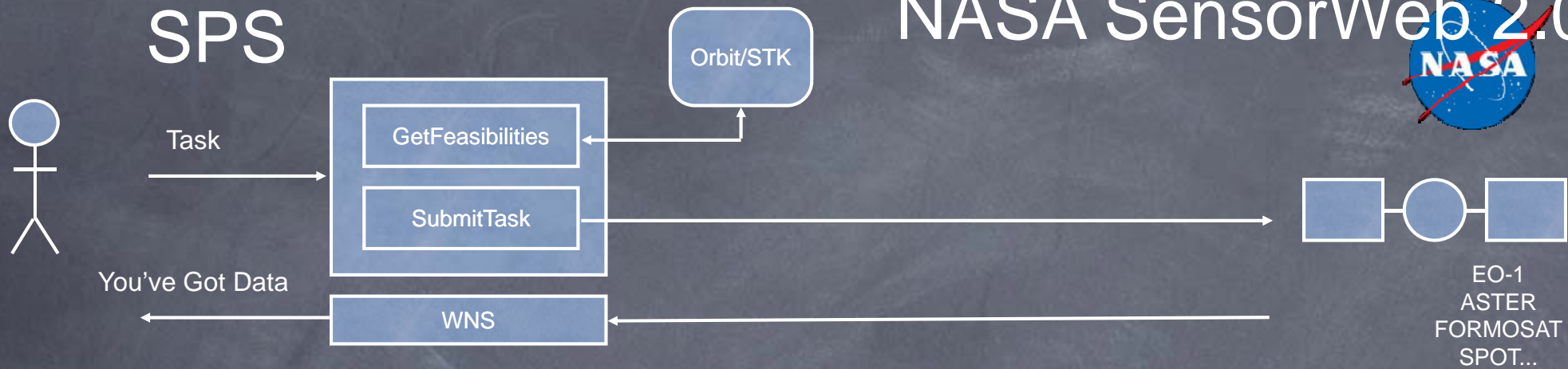
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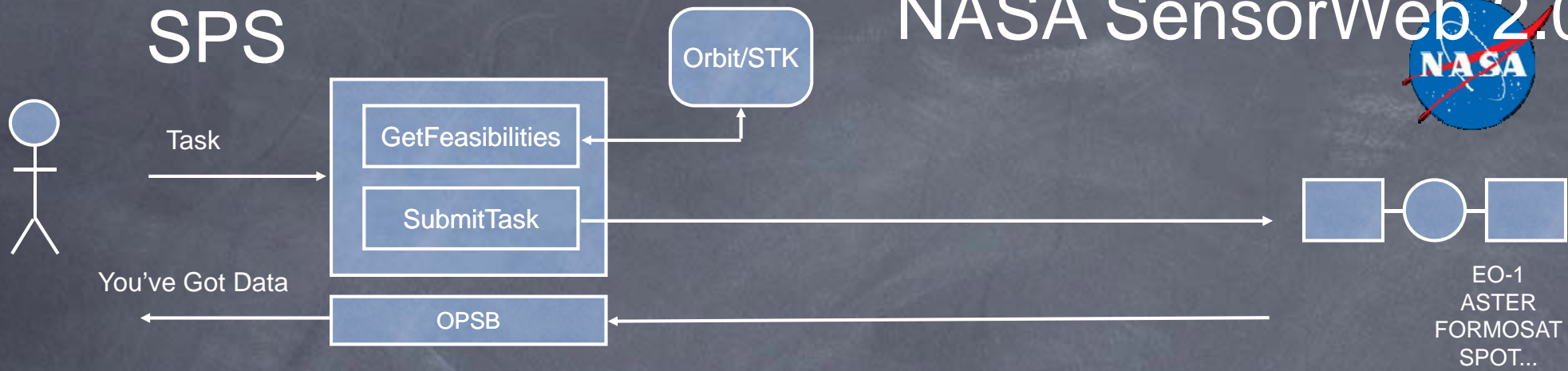
Sensor Planning Service

SPS

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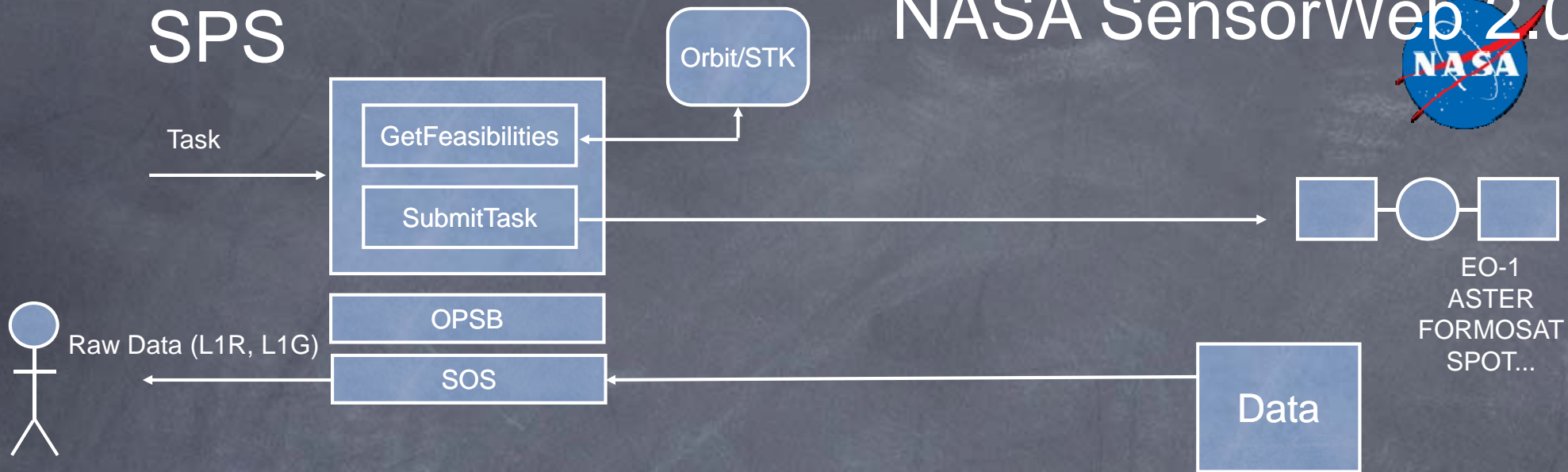


Web Notification Service



SPS

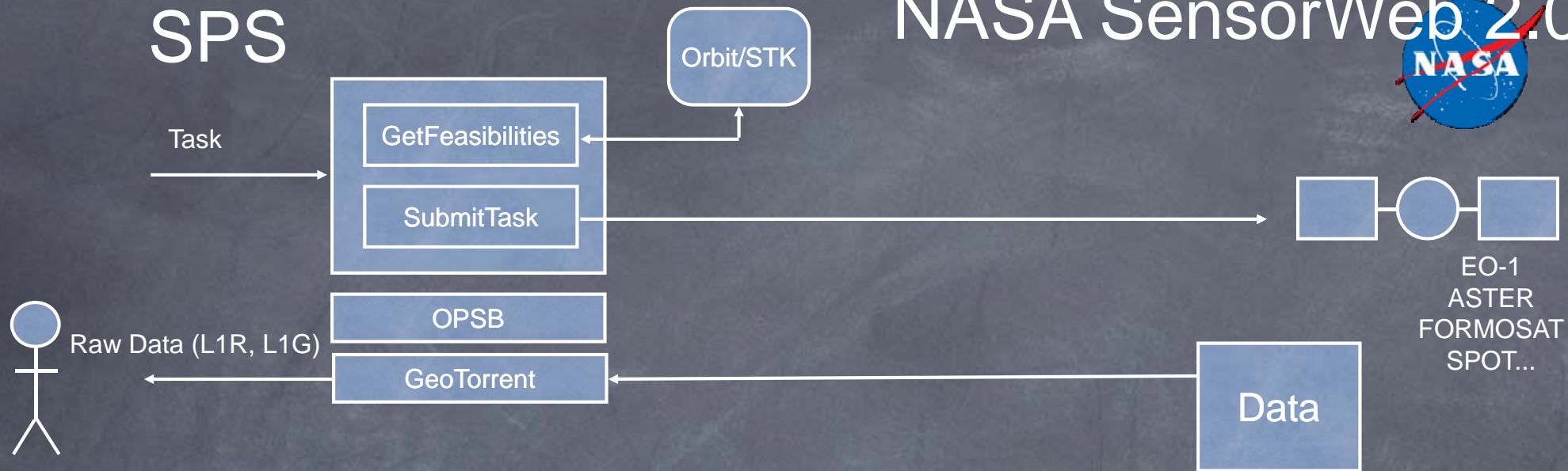
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Sensor Observation Service

SPS

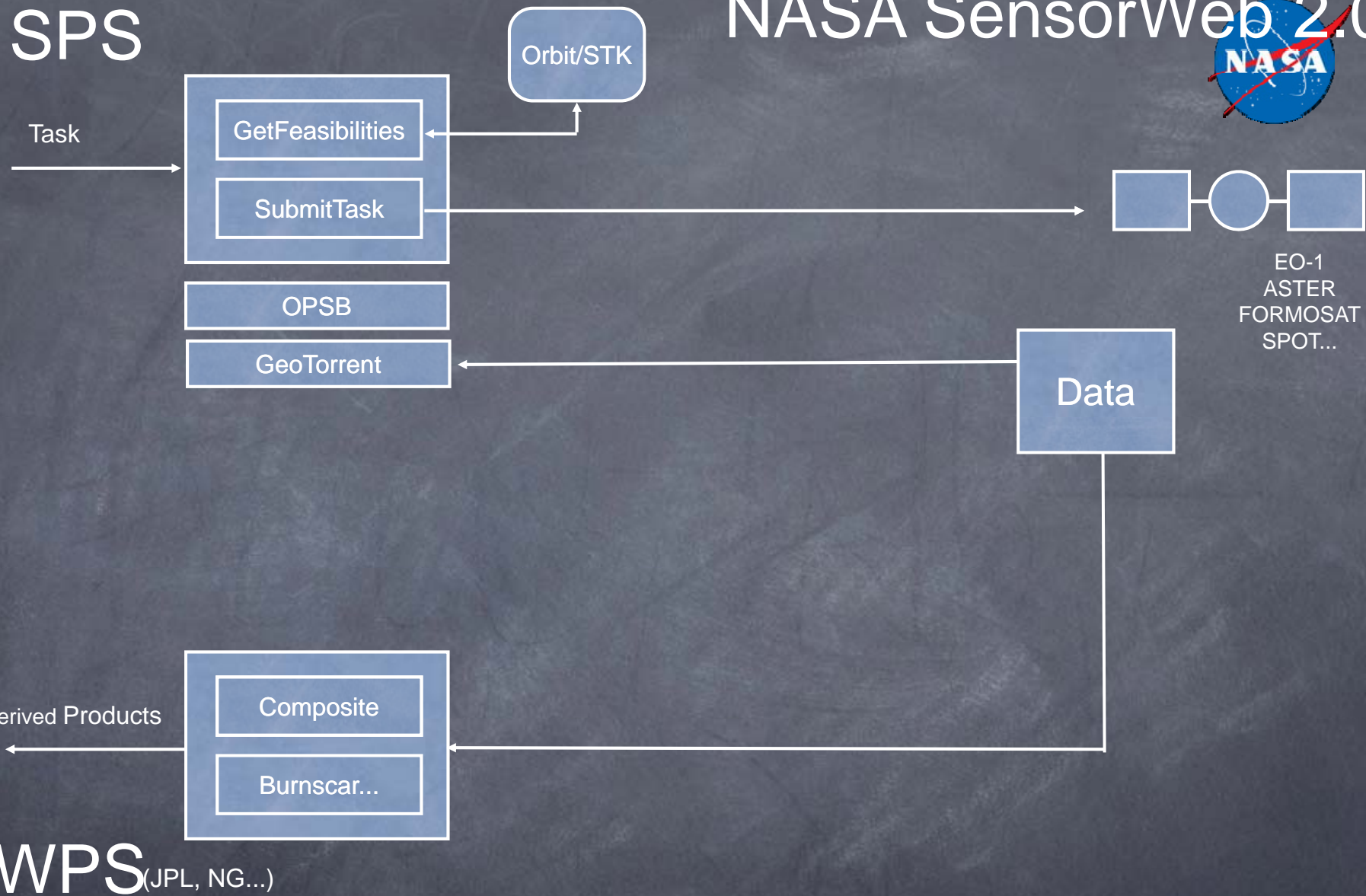
NASA SensorWeb 2.0



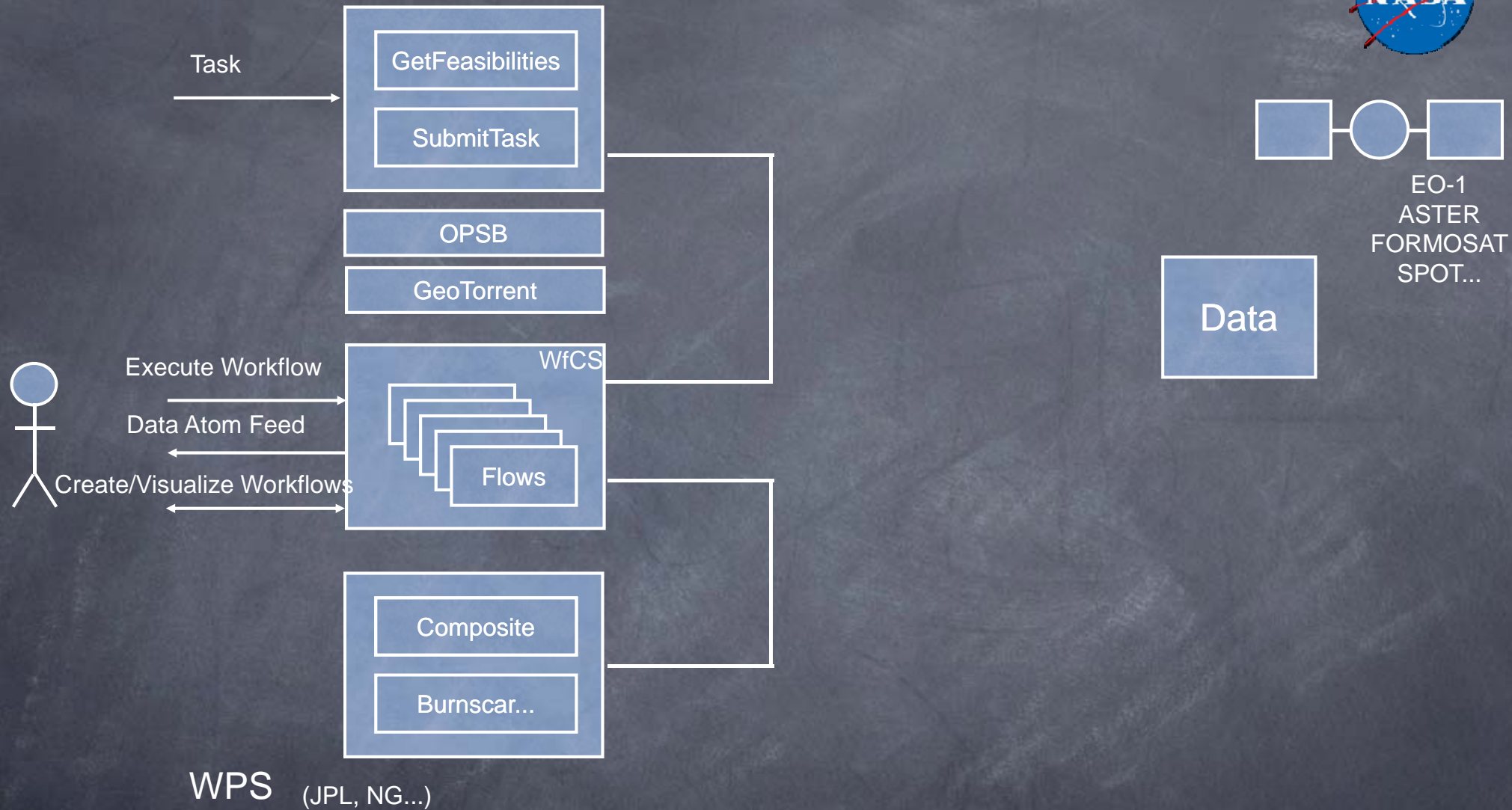
GeoTorrent Service

SPS

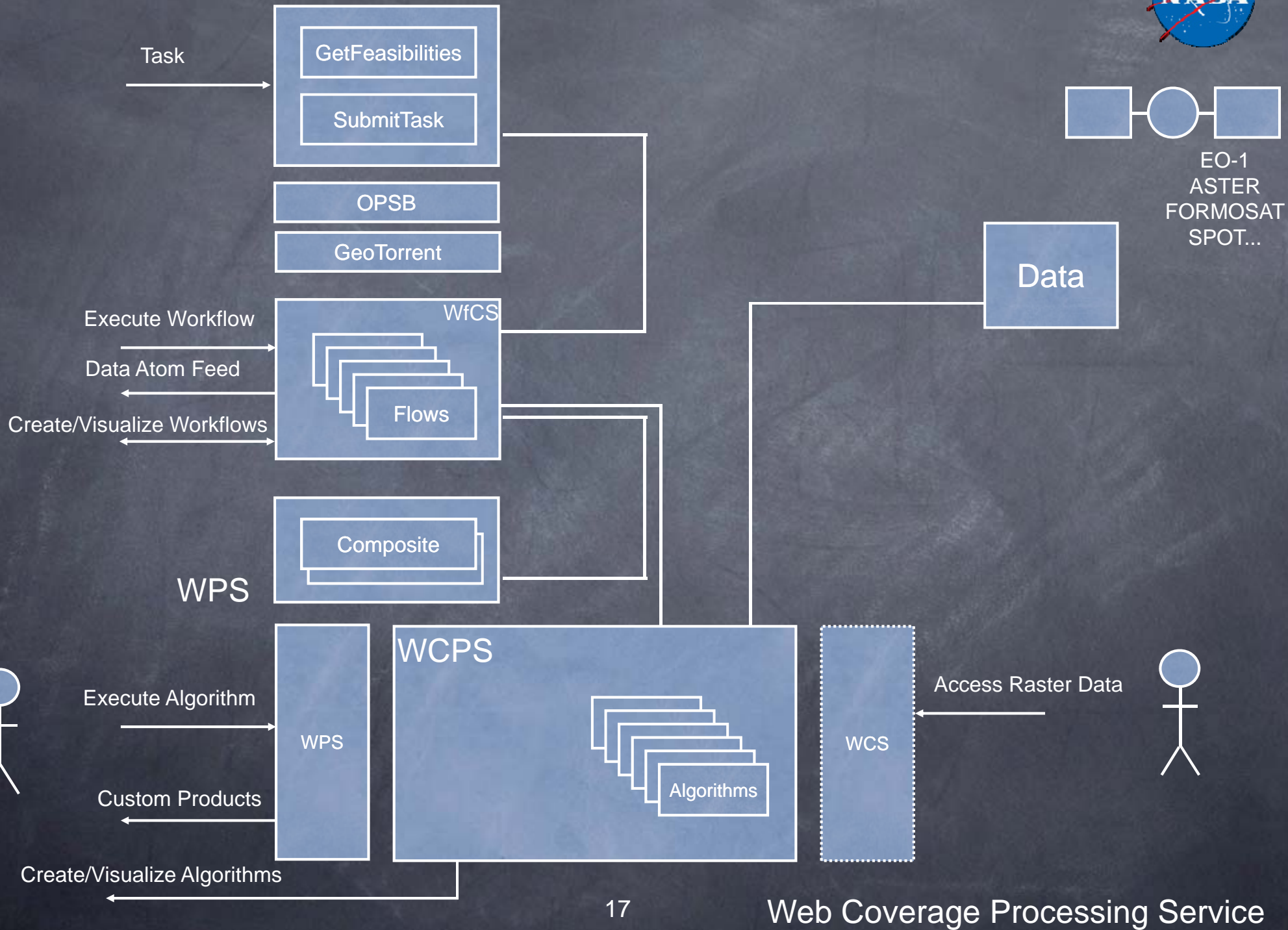
NASA SensorWeb 2.0



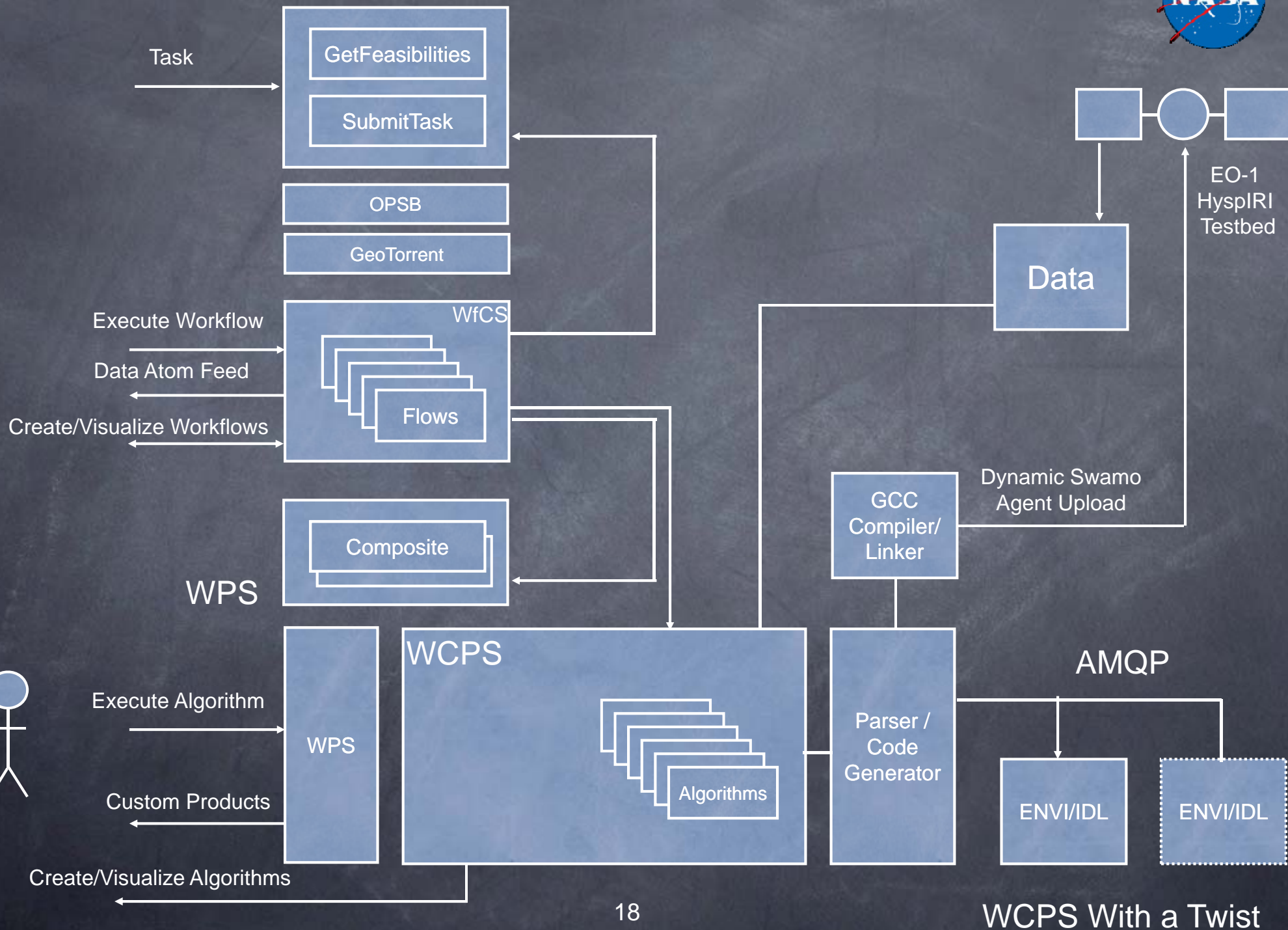
Web Processing Service



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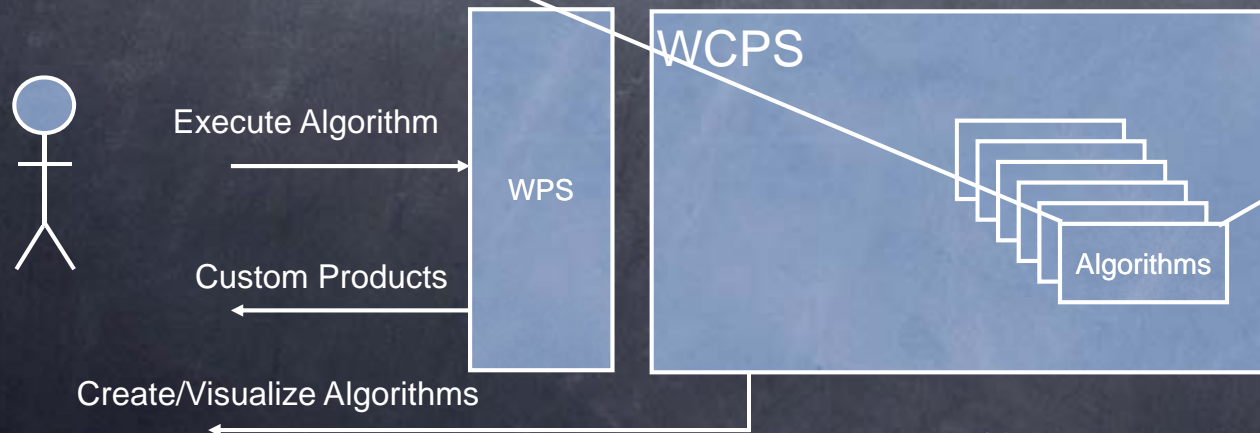


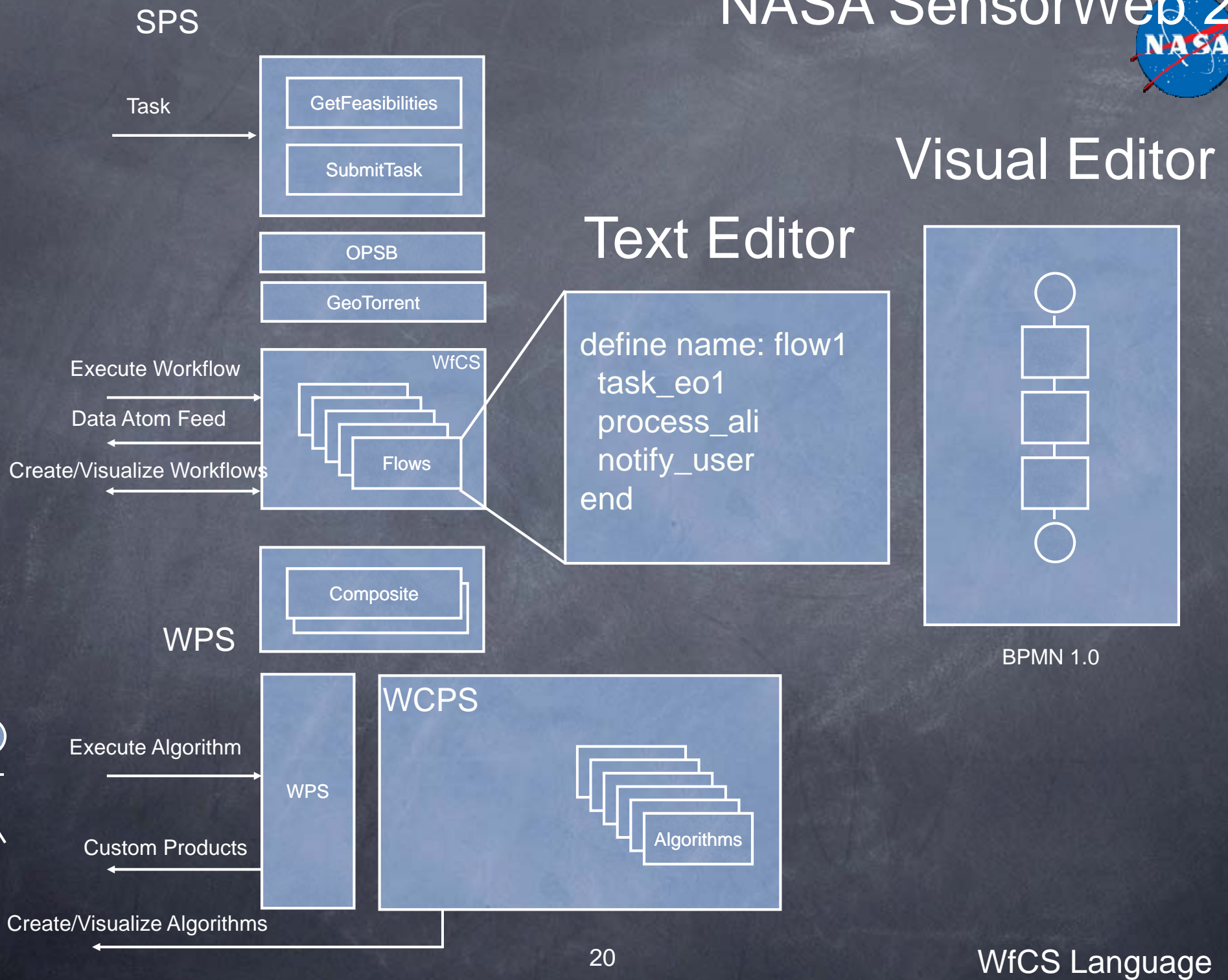
NASA SensorWeb 2.0



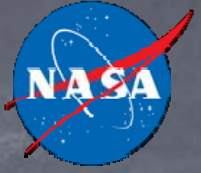
WCPS: A SQL-like Query Language

```
for c in ( NIR )
return
  encode(
    (char) ( ((c.0 / ((float)c.0 + c.1))-(c.1 / ((float)c.0 + c.1)))> 0.6 ) * 255,
    "png" )
```



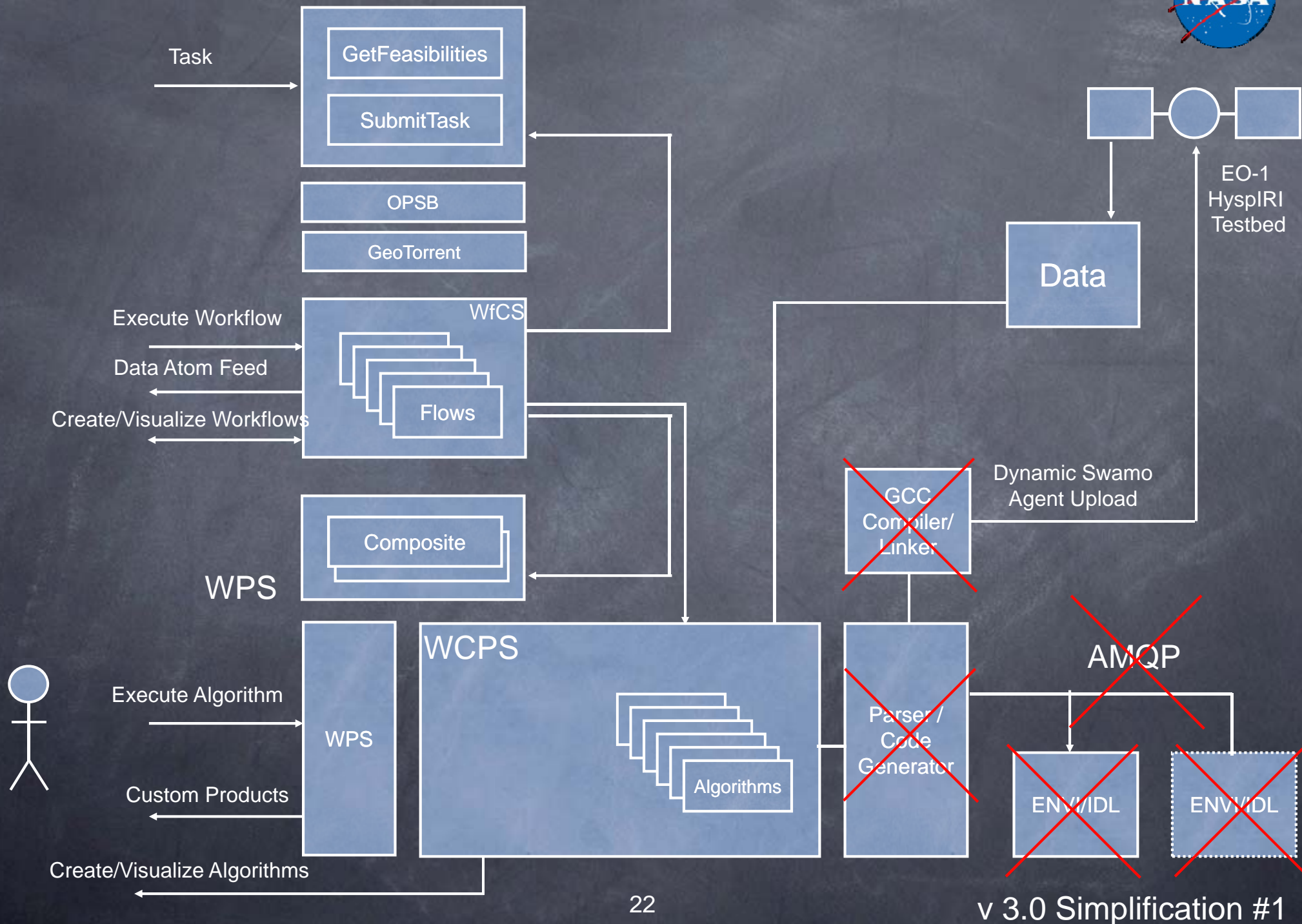


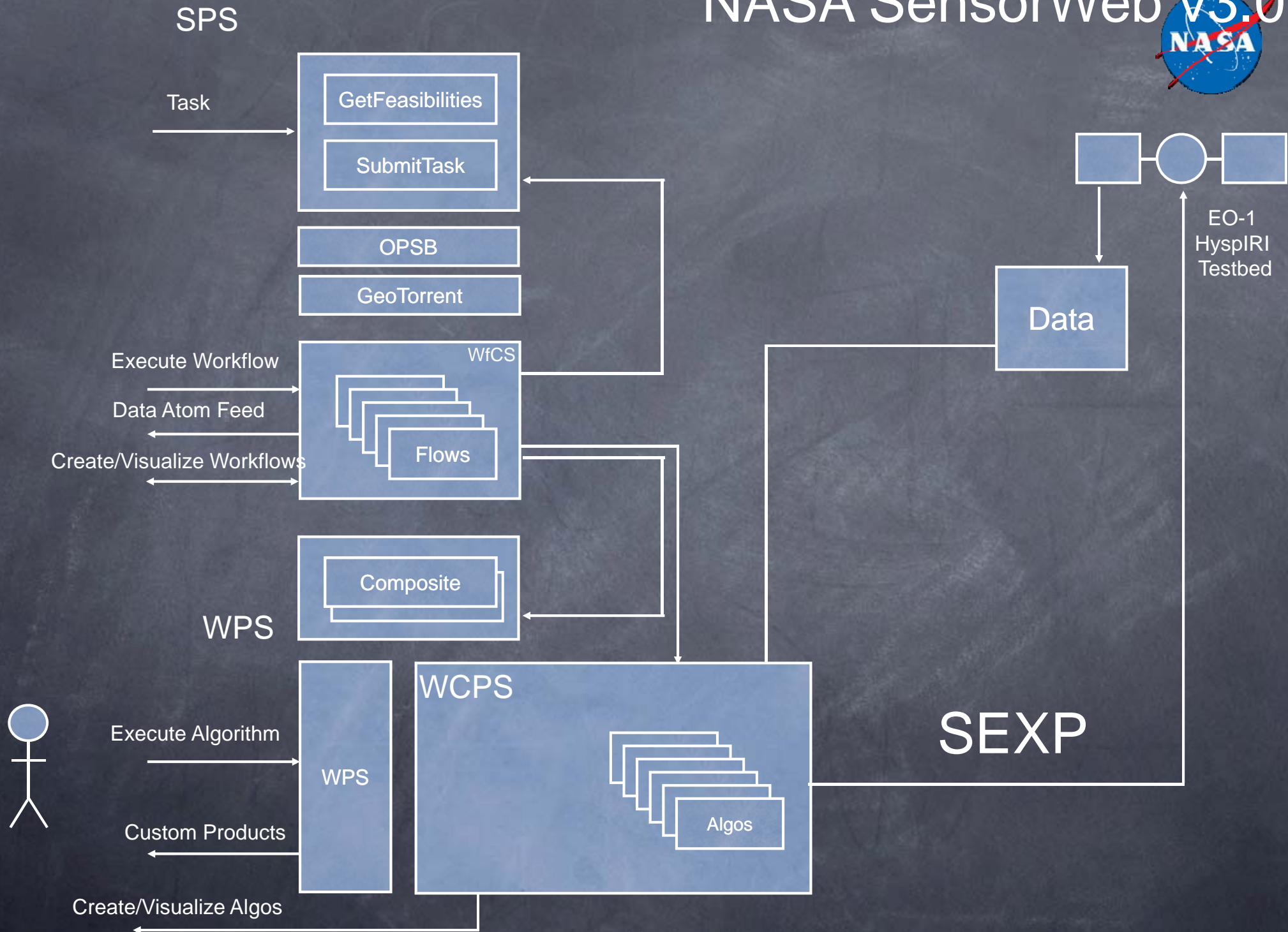
v2.0 Lessons Learned

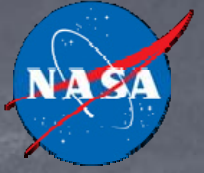


- Too Many Ways to Do Similar Things
 - Execute Task, Process, Workflow, Algorithm...
 - Hard Learning Curve on Users and Implementors
- Two Languages:
 - For Workflows and Algorithms Developments
- What About Web Service Security?

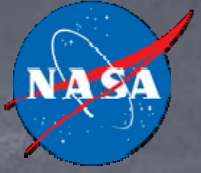
NASA SensorWeb v3.0







SEXP?

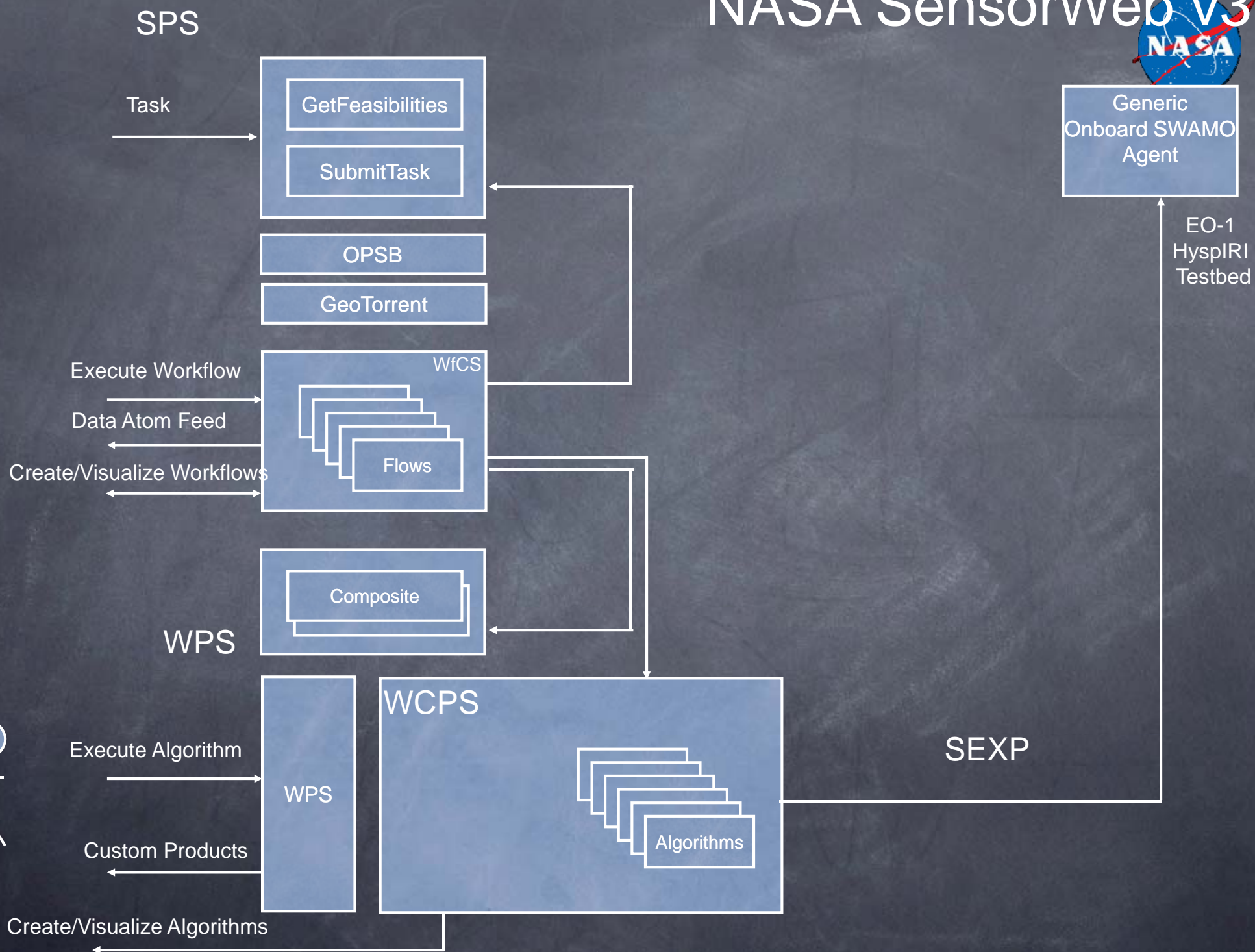


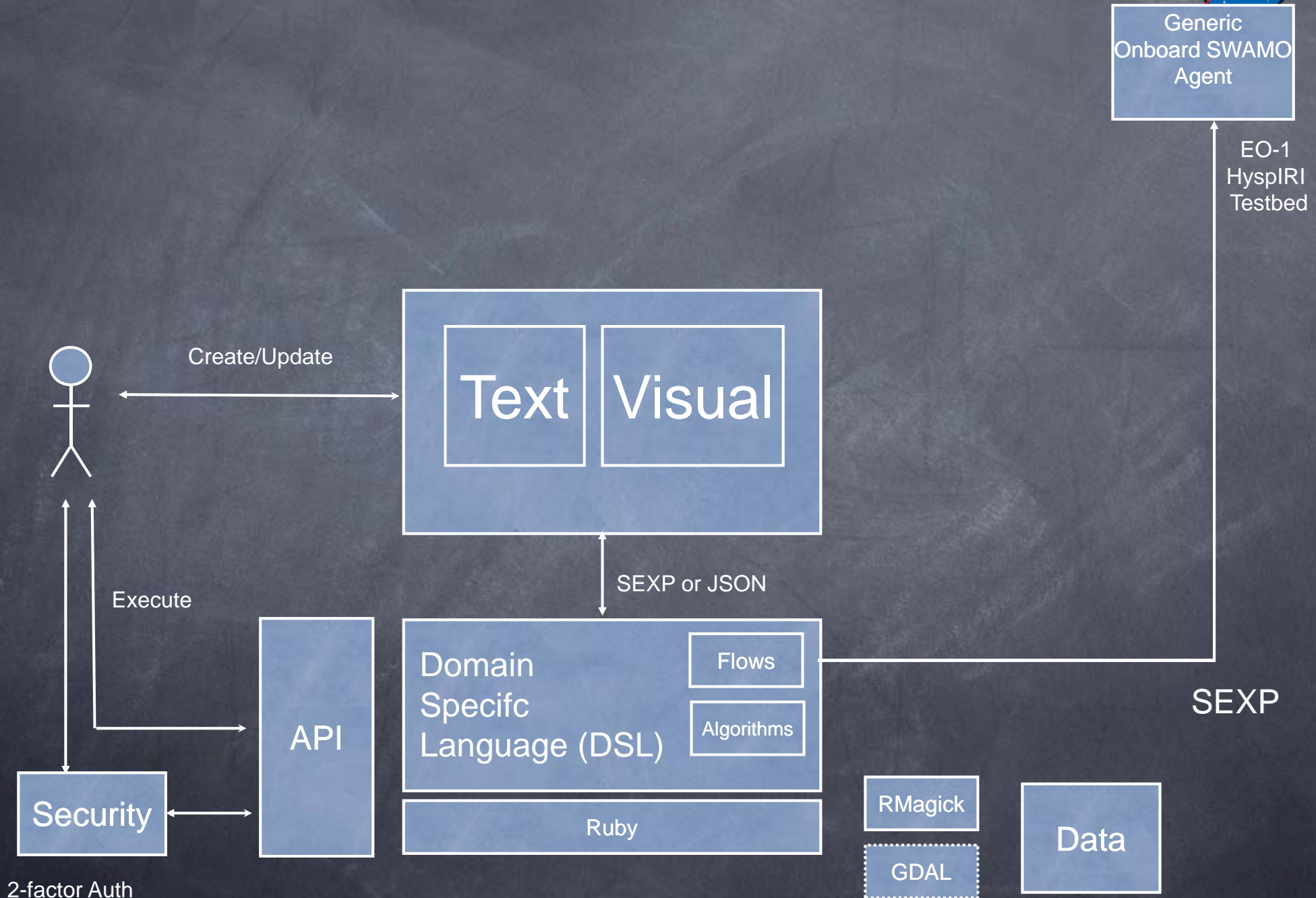
S-Exp or Symbolic Expressions

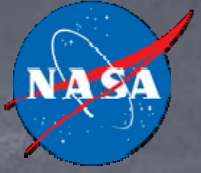
Think LISP or Parse Trees

`(= 4 (+ 2 2))`

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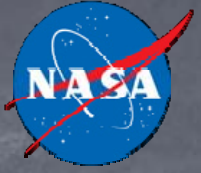






DSL Example

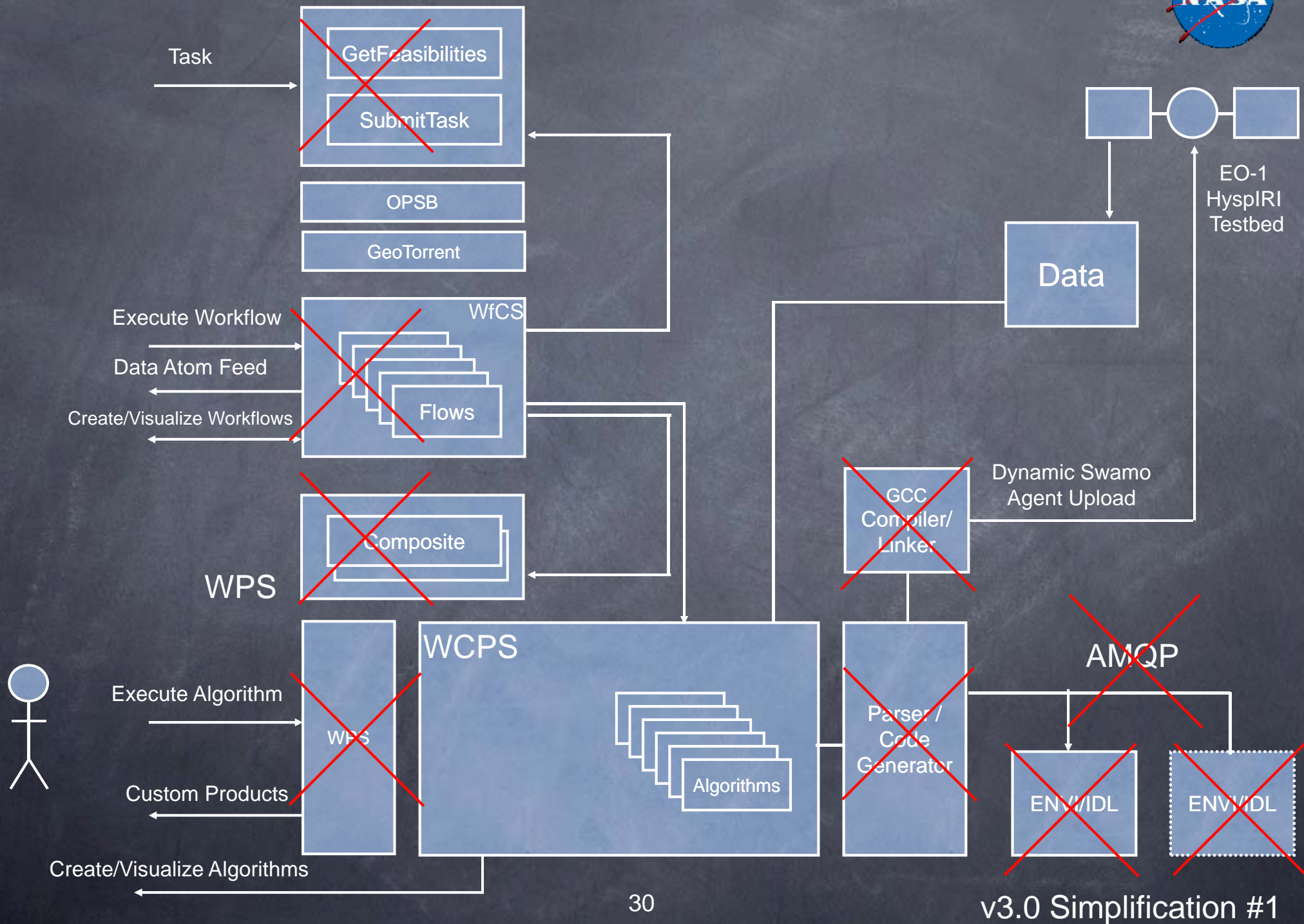
```
define name:'ali_l1g_visible', author:'Pat C.', revision:1.0
  scene asset:EO1, instrument:'ALI', data:'L1g'
    b5 = band(5)
    b4 = band(4)
    b3 = band(3)
    mask = b5 > 0
    composite_image red:b5, green:b4, blue:b3, alpha:mask
      stretch percent:2
      compression quality:50 # 0 to 100, 100% being highest quality
      encode type:'jpg'      #could do tif, png, kmz
    end
  end
end
```



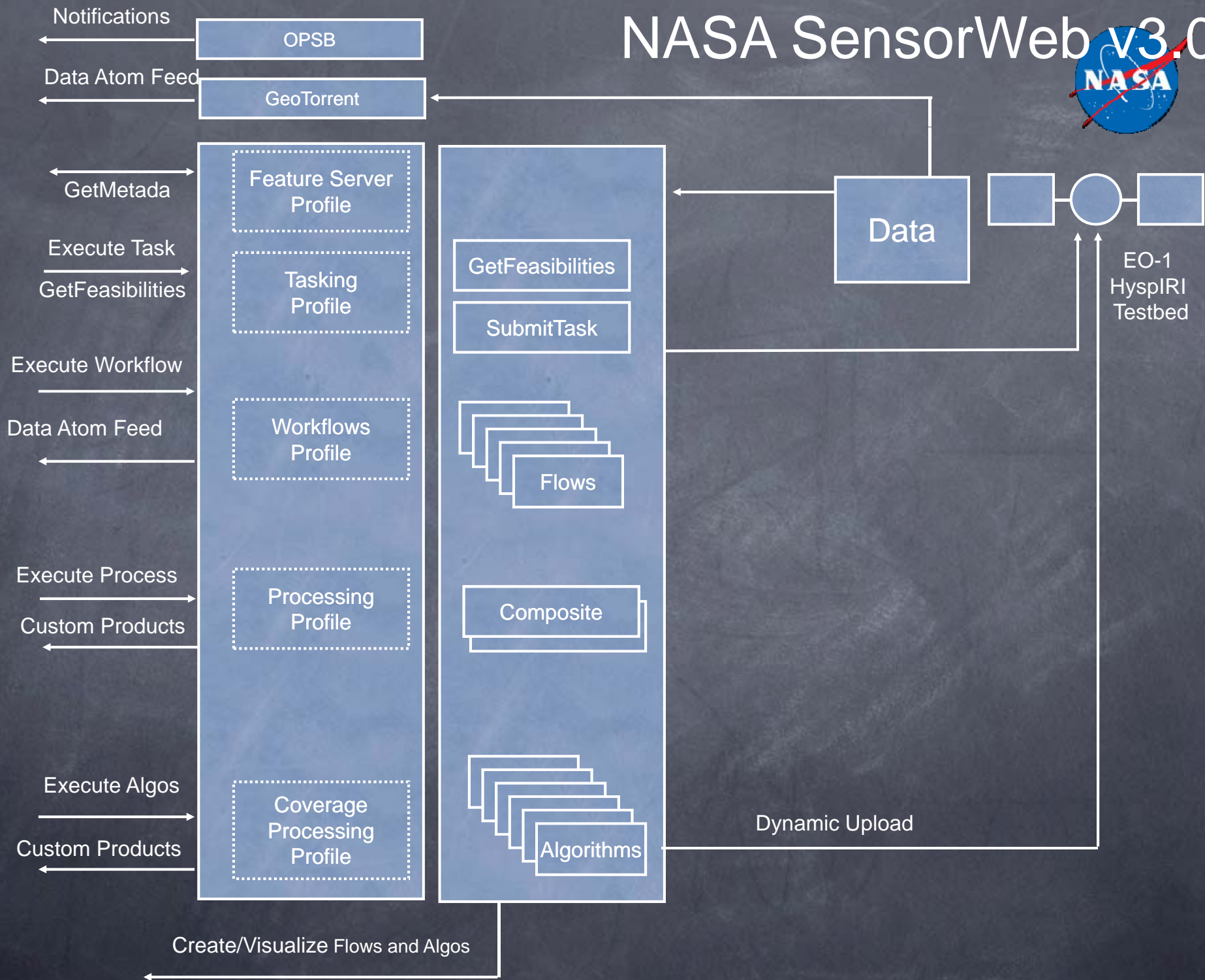
DSL Example

```
define name:'ali_ndvi', author:'Pat C.', revision:1.0
  scene asset:EO1, instrument:'ALI', data:'L1g'
    b7 = band(7)
    b5 = band(5)
    mask = b7 > 0 and b5 > 0
    normalized_difference_ratio first:b7, second:b5
    stretch percent:2
    colorize map:'prism'
    compression quality:50 # 0 to 100, 100% being highest quality
    encode type:'kmz'      #could do tif, png, jpg, kmz
  end
end
end
```

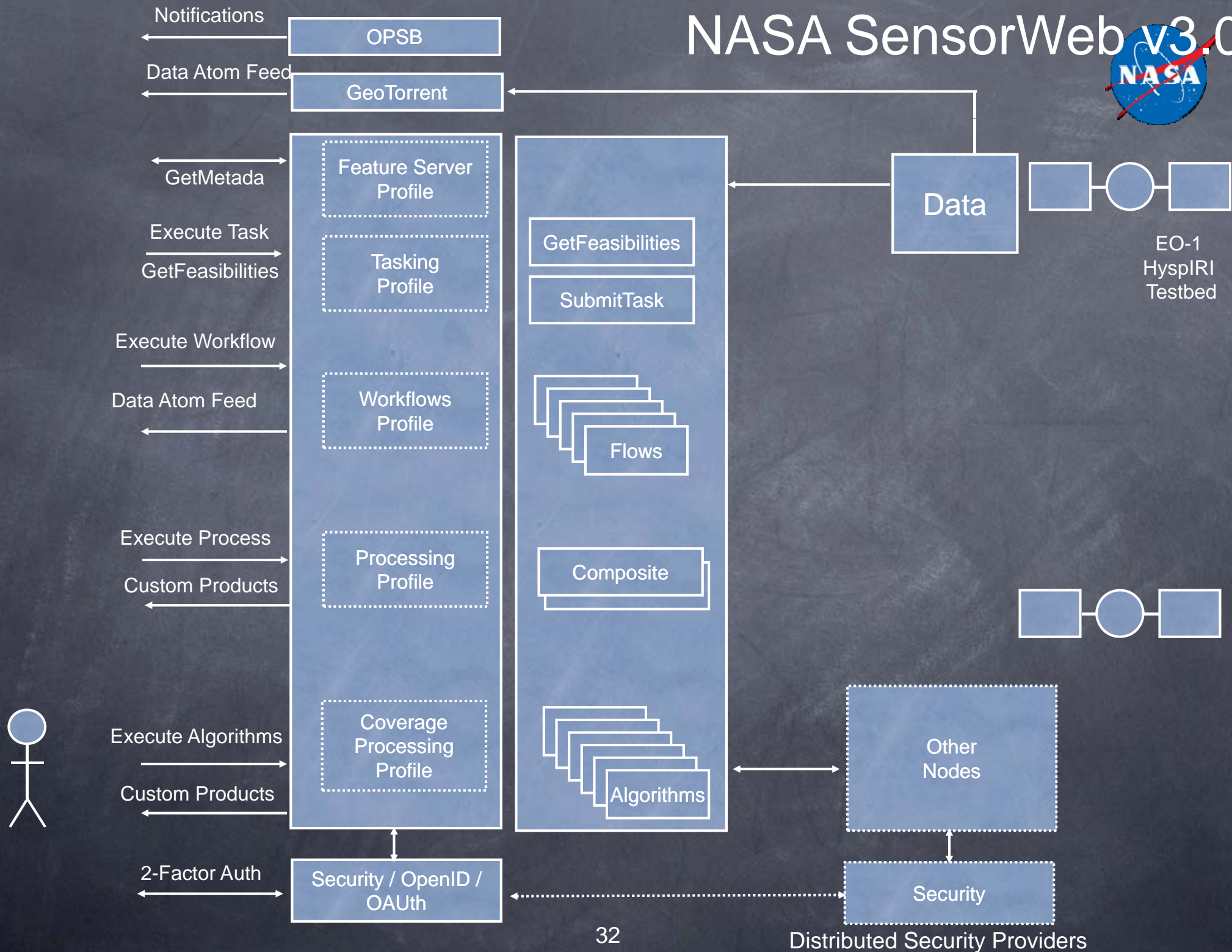

NASA SensorWeb v3.0



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NASA SensorWeb v3.0



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